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MEMORANDUM FOR   Jason Fields
                           Survey Director, Survey of Income and Program Participation
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From: James B. Treat   *James B. Treat*
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Subject: Nonresponse Bias Analysis for Waves 3-16 of the 2008 Survey of
                           Income and Program Participation (SIPP) (ALYS-15)

This document describes the results of the nonresponse bias analysis for Waves 3-16 of the 2008 Survey of Income and Program Participation (SIPP).

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cc:

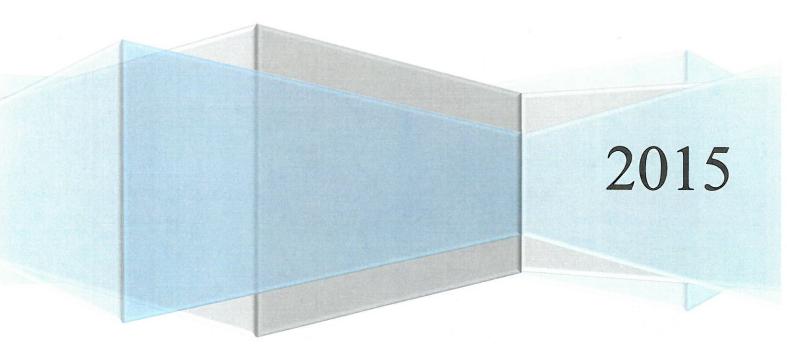|	
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Nonresponse Bias Analysis for Waves 3-16 of the 2008 Survey of Income and Program Participation (SIPP)

By Jamie Choi and Tracy Mattingly

2015

Introduction

For a household survey, unit nonresponse is the failure to obtain any survey measures on a sample unit (e.g. household). These nonresponse rates have been increasing in recent years, even for the large government surveys. With this increasing nonresponse there is also growing concern over data quality and losing valuable information from these nonrespondents. Declining response rates can be an indicator of nonresponse bias, or a difference in survey measures between respondents and nonrespondents, which can affect data quality. However, there is not always a direct link between response rates and nonresponse bias since nonresponse bias can vary across different statistics in the same survey; low response rates in surveys may yield to some statistics having large nonresponse bias [3]. Therefore, understanding and measuring nonresponse bias for key estimates is an important aspect in determining overall data quality.

Because policy makers use estimates from the demographic surveys conducted by the U.S. Census Bureau and other agencies to determine the successfulness of programs or for national economic indicators, the highest data quality is necessary. This has led more surveys to investigate nonresponse bias, especially after the Office of Management and Budget (OMB) released their standards in 2006 that require survey programs to make plans for a nonresponse bias analysis if unit response rates fall below 80% [8]. The Census Bureau incorporated this guideline into its own standards along with guidelines which state that serious data quality issues related to nonsampling error can occur when cumulative response rates for a longitudinal survey fall below 60% and when sample attrition from wave to wave is greater than 5% [16].

The 2008 Survey of Income and Program Participation (SIPP) obtained a response rate of 80.8% at the first interview. The panel ended in December 2013 with a cumulative response rate of 49.4%.

This report presents an analysis of nonresponse bias for Waves 3-16 of the 2008 SIPP. The analysis takes into account the longitudinal aspect of the survey and utilizes the data available for those who drop out after Wave 1 to give a better picture of the overall bias associated with nonresponse. Two different studies are used to examine potential nonresponse bias. The methods include comparing key estimates of the full sample to the respondent sample and estimating the representivity of the survey using R-indicators.

Previous Research

Previous efforts to examine the bias and determine the impact on SIPP estimates included comparing characteristics of households that responded in all waves versus those that dropped out. The SIPP nonresponse workgroup found that households that were renting, living in large urban areas, and had young adults (15-24) as the householder were more likely to be nonrespondents [13]. Another study compared SIPP annual poverty rates and health insurance coverage to CPS-ASEC. Results showed differences in poverty rates at the 150% and 200% poverty thresholds and differences in health insurance coverage, especially among blacks and Hispanics [10]. Mack and Petroni [4] summarized the results from several studies that looked

into using logistic regression and various raking methodologies for nonresponse weighting adjustments. The results indicated that alternative weighting procedures did not reduce the bias more than the current adjustment for estimates of income, unemployment, government assistance and poverty.

A study completed on Wave 1 of the 2008 Panel showed through benchmark analysis that the SIPP is underestimating participation in Supplemental Nutrition and Assistance Program (SNAP), Supplemental Security Income (SSI), Medicaid, and Medicare compared to the program sources. Examining response rates across different subgroups found that those living in the Northeast had the lowest response rate out of all regions, Black householders had a lower response rate compared to Nonblack householders, and metropolitan statistical area (MSA) and principal city residents had lower response rates compared to those not living in the MSA or in the principal city. Comparing estimates of the frame variables for the full sample and for respondents-only found differences for region, urban/rural status, CBSA type, and race. The study also showed through odds ratios obtained from a logistic regression analysis that region, household size, and age of householder significantly affected the likelihood of responding [5].

Analysis completed on Wave 2 of the 2008 Panel showed by comparing estimates of the full sample and respondent sample that Wave 2 of the SIPP may be overestimating household earnings, household income, and participation in Medicare and Social security. Participation in Medicaid and SNAP may be underestimated in the responding sample. However, none of the relative differences for these key measures was greater than 5%. In addition, the large estimate of the R-indicator suggests that there is a high likelihood the respondent sample is representative of the sample or population [6].

Data

The SIPP is a longitudinal survey that collects detailed information about income, employment, health insurance, and program participation for the civilian, noninstitutionalized population living in the United States. The 2008 SIPP panel started on September 2008 and ended on December 2013 with interviews being conducted at four-month intervals called waves.

The Census Bureau employed a two-stage sample design to select the 2008 SIPP sample. A systematic selection was used to select housing units within 351 primary sampling units (PSUs) from the master address file created from the 2000 Decennial Census. In addition, households located in areas with a higher concentration of low-income households were oversampled by 44 percent to increase the accuracy of estimates for statistics of low-income households and program participation [14].

When a respondent is interviewed, data is collected about the four preceding months. These four reference months comprise one wave. The sample in Wave 1 of the 2008 SIPP consisted of approximately 65,500 households of which only 52,029 of the households were eligible for interview. Of those eligible households, 42,030 were interviewed, with a response rate of 80.8% [18]. In subsequent waves, all adults who were interviewed in Wave 1 were followed and interviews were attempted for all household members.

Because SIPP is longitudinal, single wave response rates do not give a complete picture of nonresponse. The total sample attrition is also examined. The SIPP measures sample attrition using a sample loss rate, which is calculated by taking into account the Wave 1 nonresponse and each subsequent wave's nonresponse [18]. Given that SIPP interviews new household members joining the household after Wave 1, the growth of nonresponding households is estimated and included in the sample loss rate. The sample loss rate is 19.2% for Wave 1 and 50.5% for the final wave of the panel.

This study analyzes nonresponse bias for Waves 3 to 16 of the 2008 SIPP. The sample (i.e., households that were interviewed in Wave 1) for Waves 3 to 16 is 42,029[1] households. The analysis in this report does not include households spawned from an original sample household.

Analytic Variables

This report focuses on analysis of nonresponse bias for key estimates of the 2008 SIPP. Actual estimates of nonresponse bias can only be produced for variables that are known for both respondents and nonrespondents. Because of the longitudinal aspect of the survey, information on key estimates collected in Wave 1 can be used to analyze nonresponse bias in later waves of the survey.

The SIPP key estimates that are assessed for potential nonresponse bias include:
- *Mean (monthly) household earnings*
- *Mean (monthly) household income*
- *Percent of households where at least one household member was covered by Medicaid*
- *Percent of households where at least one household member was covered by Medicare*
- *Percent of households where at least one household member received Social Security*
- *Percent of households where at least one household member received SSI*
- *Percent of households where at least one household member received SNAP benefits*

In addition, variables used for household noninterview weighting adjustments are also examined [7]. These variables include:

- *Age of Reference Person* (Four levels: Under 25, 25-34, 35-54, 55+)
- *Assets* (Two levels: Bonds/Etc. - at least one HH member possessed at least one of the following assets: money market deposit accounts, certificates of deposit, mutual fund shares rental property, mortgages, royalties, or other financial investments; Minimal – other)
- *CBSA area* (Three levels: In Principal City of MSA, In MSA not in Principal City, Not in MSA or Principal city)

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[1] The analysis does not include households with reference persons whose age is less than 15. The number of interviewed households including those households is 42,030.

- *Education* - Highest level of school completed or the highest degree received by the reference person (Four levels: Less than high school; 9th-12th, no diploma; High school graduate, some college (no degree), vocational/technical school, associate degree; Bachelor's/Master's/Doctorate/Professional degree)
- *Gender of Reference Person* (Two levels: Male, Female)
- *Household Size* (Four levels: 1 persons in the household, 2 persons in the household, 3 persons in the household, 4+ persons in the household)
- *Household Type* (Three levels: Reference person is female with no husband present and with her own children less than 16 years old (FHHNSP), Reference person is 65 years old or older, Other)
- *Income Type* (Two levels: Welf/Etc. - at least one household member received income from at least one of the following sources: SSI, Aid to Families with Dependent Children (AFDC), other welfare, Women, Infants, and Children Nutrition Program (WIC), SNAP, or Medicaid; Other)
- *Race of Reference Person* (Two levels: Black, Non-Black)
- *Region* (Four levels: Northeast, Midwest, South, West)
- *Tenure* (Two levels: Renter, Owner)
- *Urban/Rural* (Two levels: Urban area, Rural area)
- *Within PSU Strata* (Two levels: Low income strata, Non-low income strata) This variable was based on a probability calculated using 2000 Census Long Form income data within a designated geographic region.

Methods

The analysis involves using two different studies for measuring nonresponse bias for key estimates in Waves 3 to 16 of the 2008 SIPP. These studies utilize Wave 1 data of the 2008 Panel to examine possible nonresponse bias occurring in Waves 3 to 16 of the SIPP. The methods include comparing estimates of the full sample to the respondent sample and estimating the representivity of the survey using R-indicators.

Comparing Estimates of the Full Sample to the Respondent Sample

The first study involves comparing key estimates of the full sample (respondents and nonrespondents) to estimates of the respondent sample for each wave between Waves 3 to 16 of the SIPP. Using the variables available in Wave 1, differences between the weighted statistics (means or percentages) of the full sample and the respondent sample are examined. Initial weights, which are the weights that have incorporated unit nonresponse from Wave 1, are used in estimating the weighted statistics. Examining the differences between the estimates gives insight into the magnitude and direction of bias.

Fay's method of Balanced Repeated Replication[2] (BRR) is used to estimate the variance of the difference between the full sample and the respondent sample estimates. The resampling method accounts for both the complex survey design and the random error (variability) due to sampling and nonresponse.

Estimating the R-Indicator

The second analysis involves estimating the R-indicator to examine the potential for nonresponse bias. R-indicators measure how representative the respondents are compared to the original sample or population [20].

The estimation of the R-indicator involves fitting a weighted logistic regression model that predicts the probability of being a respondent as a function of Wave 1 variables to estimate response propensities. The standard deviation of the response propensities is obtained from the model, and the R indicator is estimated by the following equation [20]:

$$\hat{R} = 1 - 2S_{\hat{\rho}} = 1 - 2\sqrt{\frac{1}{\sum_{i=1}^{42,029} w_i - 1} \sum_{i=1}^{42,029} w_i (\hat{\rho}_i - \bar{\hat{\rho}})^2},$$

where
w_i is the initial weight
$\hat{\rho}_i$ are the response propensities estimated using the logistic regression model.

Values of the R-indicator that are close to one are an indication of strong representativeness since large values occur when the standard deviation of the response propensity is small. This means that the response propensities tend to be more similar, and therefore the respondents are more likely to be representative of the sample or population. Values close to zero are an indication of weak representativeness or that the respondents are less likely to be representative of the sample or population.

A confidence interval is constructed for the estimate of the R-indicator using Fay's method of BRR, which accounts for the sample design and the model used to estimate the response propensities [20].

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[2] The 116 replicate weights using the Fay's method of BRR are produced in SAS using the PROC SURVEYMEANS procedure with adjustments for sample design and the VARMETHOD=BRR(FAY=0.5 OUTWEIGHTS=) statement. Initial weights are used to produce replicate weights.

Results

Table 1 summarizes the results of comparing estimates of the full sample to the respondent sample for multiple waves of the 2008 SIPP. Estimates for the full sample use the initial weight; and two estimates are calculated for the respondent sample, one weighted by the initial weight and the other weighted by the nonresponse adjusted weight. While results with the initial weight can identify the presence of nonresponse bias, the results from using the nonresponse adjusted weight will indicate if the weighting is helping to correct for some of the bias.

Relative differences are calculated for each wave comparing the current wave to the full sample estimate. The results for Waves 3, 6, 9, 12 and 15 are presented. Looking at Wave 15, 13 out of 43 estimates have a relative difference of 15% or greater. These include the following estimates: Medicare, SNAP, Social Security, West, rural, receiving welfare, owners, renters, householders < 25, householders 25-34, householders > 55, female headed household with no spouse present, and householder 65+. For some, like the householder < 25 and renters, the relative difference was greater than 15% as early as Wave 3. For other estimates, like social security and rural, the relative difference didn't reach 15% until Wave 12. Most often the nonresponse adjustment had a significant positive effect, reducing the relative difference, but the correction was generally very small.

The estimates with the largest relative differences are those for SNAP, renters, and households with reference persons less than 35. The SNAP estimate dropped from 7.6% in the full sample estimate to 5.7% for the Wave 15 respondent sample. The estimate for renter households dropped from 32% to 17% and the estimate for households with reference persons younger than 25 dropped from 4.7% to 1.3% and the estimate for households with reference persons 25-34 dropped from 15.2% to 9.1% for the Wave 15 respondent sample.

Table 2 presents results of the logistic regression model predicting the probability of a household being a respondent as a function of Wave 1 variables for Waves 3, 6, 9, 12, and 15 of the SIPP. The standard deviation of the response propensities is obtained from the model, and the R-indicator is estimated.

For Waves 3-16 of the SIPP, significant effects are observed for region, age, race, gender, education, and marital status of reference person. The South consistently has greater odds of responding than the Northeast, and the West has lower odds of responding than the Northeast across all waves. Sample units with householders who are less than 45 years of age have lower odds and units with householders who are greater than 55 years of age have higher odds of being interviewed than those who are between the ages of 45 and 54. Households with female householders have greater odds of responding than households with male householders. Compared to sample units with a White householder, units with a Black or Asian householder have lower odds of being interviewed. Households that have a householder with no high school diploma have lower odds of responding, and households with a householder with a bachelor's or a higher degree have higher odds of responding than households with a householder whose highest level of educational attainment is high school diploma or associate degree. Households with a reference person who is widowed, divorced, separated, or never married have lower odds of responding than households with a married householder.

Table 3 displays the R-indicators for Wave 3-16 of the SIPP. The R-indicator is largest at Wave 3 and smallest at Wave 12.

Table 3. R-indicators for Waves 3-16.

Wave	R-Indicator	90% CI
Wave 3	0.845	(0.8435, 0.8466)
Wave 4	0.782	(0.7799, 0.7842)
Wave 5	0.7592	(0.757, 0.7615)
Wave 6	0.7447	(0.7423, 0.747)
Wave 7	0.7207	(0.7184, 0.7229)
Wave 8	0.718	(0.7158, 0.7203)
Wave 9	0.7155	(0.7133, 0.7177)
Wave 10	0.7096	(0.7075, 0.7116)
Wave 11	0.7134	(0.7113, 0.7154)
Wave 12	0.7059	(0.7039, 0.7079)
Wave 13	0.7108	(0.7089, 0.7127)
Wave 14	0.7128	(0.711, 0.7147)
Wave 15	0.7151	(0.7133, 0.7168)
Wave 16	0.7835	(0.7823, 0.7848)

Conclusion

This analysis used two methods to examine the potential for nonresponse bias, including comparison of full sample and respondent sample estimates and estimating R-indicators. Since each method has weaknesses, no single method is sufficient on its own to draw accurate conclusions. By incorporating multiple approaches in the analysis, results were compared across methods, leading to clearer and stronger conclusions.

Some areas of potential bias were identified in the results. The relative differences between the full sample and respondent sample estimates were smallest at Wave 3 and largest at Wave 16 indicating that there may be nonresponse bias in the later waves of the SIPP. Based on the results presented, the SIPP may underestimate SNAP participation in the later waves of the panel. Other estimates potentially affected by nonresponse bias include those for households with reference persons less than 35 years of age and renters, where the later wave estimate dropped to about half of the Wave 1 estimate.

The logistic regression models that were fit to determine the R-indicators pointed to similar areas of potential bias due to certain subgroups' likelihood of responding. None of the R-Indicators for Waves 3 to 16 fell below .70 suggesting that there is a high likelihood the respondent sample is representative of the full sample or population.

A limitation of this research is that the majority of nonresponse for the SIPP happens in the first wave. Therefore, the examination of characteristics of respondents and nonrespondents in later waves may not give accurate insights into the major component of the nonresponse bias for the key estimates. In addition, results from the R-indicators are highly dependent on model assumptions and parameterization.

Many of the significant differences in the comparison of estimates are likely due to the large sample size of the survey. In classical statistics, large sample sizes lead to an increase in the probability of rejecting the null hypothesis. In the earlier waves of the SIPP, the small relative differences and large R-indicators reveal that the significant differences observed are not a cause for concern and do not directly imply that nonresponse bias exists in the earlier waves of the SIPP. However, the large relative differences and small R-Indicators in the later waves suggest that there may be the potential for nonresponse bias in the later waves of the SIPP.

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Table 1. Comparison of Estimates from Full Sample and Respondent Sample of the 2008 SIPP

Variables	All Sample Cases — Initial Weight Percent/Mean	Std Error	Wave 3 Respondents Initial Wgt Rel Diff (%)	Wave 3 Respondents Nonresp Adj Wgt Rel Diff (%)	Wave 6 Respondents Initial Wgt Rel Diff (%)	Wave 6 Respondents Nonresp Adj Wgt Rel Diff (%)	Wave 9 Respondents Initial Wgt Rel Diff (%)	Wave 9 Respondents Nonresp Adj Wgt Rel Diff (%)	Wave 12 Respondents Initial Wgt Rel Diff (%)	Wave 12 Respondents Nonresp Adj Wgt Rel Diff (%)	Wave 15 Respondents Initial Wgt Rel Diff (%)	Wave 15 Respondents Nonresp Adj Wgt Rel Diff (%)
Medicare	27.82	0.25	6.04 *	3.49 *	11.91 *	7.24 *	14.87 *	8.55 *	16.89 *	9.26 *	17.82 *	9.07 *
Medicaid	17.17	0.22	-4.40 *	-2.27 *	-7.94 *	-6.80 *	-10.84 *	-8.97 *	-13.68 *	-11.62 *	-14.37 *	-12.63 *
SNAP	7.56	0.14	-8.56 *	-6.28 *	-15.78 *	-14.98 *	-24.80 *	-23.15 *	-27.97 *	-27.18 *	-33.47 *	-32.58 *
SSI	4.57	0.11	-0.72	0.58	-0.34	-0.82	-2.85 *	-3.49	-2.66	-3.95	-3.78	-5.47
Social Security	30.14	0.26	5.42 *	3.18 *	11.07 *	6.91 *	13.79 *	8.07 *	15.99 *	8.96 *	16.91 *	8.77 *
Household Earnings	$4,307.26	39.81	1.47 *	1.66 *	1.44 *	3.80 *	1.81 *	4.99 *	3.12 *	7.08 *	2.61 *	7.13 *
Household Income	$5,391.53	41.07	2.06 *	1.84 *	3.19 *	4.45 *	4.31 *	5.95 *	5.70 *	7.70 *	6.04 *	8.20 *
Region												
Northeast	18.85	0.17	0.89	1.31 *	2.72 *	3.45 *	2.66 *	3.84 *	3.69 *	4.62 *	3.66 *	4.92 *
Midwest	22.9	0.24	1.95 *	1.06 *	0.89	0.86	0.41	0.03	1.39	1.11	1.08	1.00
South	35.94	0.27	1.05 *	0.96 *	3.50 *	2.97 *	4.89 *	4.44 *	4.90 *	4.34 *	5.32 *	4.62 *
West	22.32	0.22	-4.76 *	-3.98 *	-10.10 *	-9.77 *	-12.43 *	-12.28 *	-14.97 *	-14.41 *	-15.52 *	-15.27 *
Urban/Rural												
Rural	20.6	0.58	5.58 *	4.60 *	9.19 *	8.75 *	12.29 *	11.98 *	14.93 *	14.56 *	16.19 *	15.91 *
Urban	79.4	0.58	-1.56 *	-1.27 *	-2.70 *	-2.55 *	-3.77 *	-3.66 *	-4.77 *	-4.62 *	-5.28 *	-5.16 *
Within PSU Strata												
Non-low income Strata	76.8	0.32	1.13 *	0.73 *	1.59 *	1.58 *	2.25 *	2.26 *	2.55 *	2.54 *	2.74 *	2.82 *
Low income Strata	23.2	0.32	-3.93 *	-2.48 *	-5.64 *	-5.61 *	-8.24 *	-8.27 *	-9.48 *	-9.44 *	-10.29 *	-10.62 *

(Table 1 continued)

Variables	All Sample Cases Initial Weight Percent/Mean	Std Error	Wave 3 Respondents Initial Wgt Rel Diff (%)		Nonresp Adj Wgt Rel Diff (%)		Wave 6 Respondents Initial Wgt Rel Diff (%)		Nonresp Adj Wgt Rel Diff (%)		Wave 9 Respondents Initial Wgt Rel Diff (%)		Nonresp Adj Wgt Rel Diff (%)		Wave 12 Respondents Initial Wgt Rel Diff (%)		Nonresp Adj Wgt Rel Diff (%)		Wave 15 Respondents Initial Wgt Rel Diff (%)		Nonresp Adj Wgt Rel Diff (%)	
CBSA Type																						
In Principal City of MSA	32.83	0.75	-4.21	*	-3.17	*	-7.14	*	-6.90	*	-8.85	*	-8.68	*	-11.53	*	-11.32	*	-12.35	*	-12.11	*
In MSA not in Principal City	50.3	0.92	1.39	*	1.06	*	2.65	*	2.82	*	2.66	*	2.83	*	3.41	*	3.60	*	4.01	*	4.20	*
Not in MSA or principal City	16.86	1.29	3.60	*	2.77	*	4.68	*	3.81	*	7.18	*	6.48	*	8.81	*	8.02	*	8.25	*	7.42	*
HH size																						
1	28.63	0.27	-2.31	*	-2.85	*	-3.69	*	-7.10	*	-5.84	*	-10.63	*	-8.16	*	-14.17	*	-10.70	*	-17.19	*
2	34.74	0.28	2.14	*	1.54	*	3.74	*	3.06	*	5.46	*	4.53	*	6.74	*	5.28	*	8.15	*	6.44	*
3	15.08	0.17	-0.97	*	0.11		-2.06	*	1.21		-2.37	*	1.27		-1.08	*	3.49	*	-0.52		3.71	*
4+	21.54	0.2	0.19		1.12	*	-0.08		2.82	*	-0.31		4.09	*	-0.85		4.78	*	-1.07		5.44	*
Assets																						
Bonds/Etc.	39.05	0.32	4.57	*	3.51	*	7.68	*	7.58	*	10.16	*	9.76	*	11.53	*	11.26	*	12.84	*	12.53	*
Minimal	60.95	0.32	-3.17	*	-2.39	*	-5.63	*	-5.55	*	-7.81	*	-7.45	*	-9.11	*	-8.85	*	-10.42	*	-10.10	*
Income Type																						
Welf/Etc.	18.98	0.24	-4.80	*	-2.72	*	-8.45	*	-7.40	*	-11.59	*	-9.83	*	-14.48	*	-12.55	*	-15.54	*	-13.82	*
Other	81.02	0.24	1.06	*	0.62	*	1.79	*	1.59	*	2.37	*	2.05	*	2.88	*	2.55	*	3.05	*	2.77	*
Tenure																						
Owner	68.02	0.28	6.30	*	4.95	*	11.91	*	11.17	*	14.86	*	14.02	*	16.79	*	16.05	*	18.19	*	17.48	*
Renter	31.98	0.28	-16.67	*	-12.47	*	-40.35	*	-36.49	*	-59.03	*	-53.08	*	-75.21	*	-68.52	*	-89.77	*	-81.96	*

(Table 1 continued)

Variables	All Sample Cases Initial Weight Percent/Mean	Std Error	Wave 3 Respondents Initial Wgt Rel Diff (%)		Wave 3 Respondents Nonresp Adj Wgt Rel Diff (%)		Wave 6 Respondents Initial Wgt Rel Diff (%)		Wave 6 Respondents Nonresp Adj Wgt Rel Diff (%)		Wave 9 Respondents Initial Wgt Rel Diff (%)		Wave 9 Respondents Nonresp Adj Wgt Rel Diff (%)		Wave 12 Respondents Initial Wgt Rel Diff (%)		Wave 12 Respondents Nonresp Adj Wgt Rel Diff (%)		Wave 15 Respondents Initial Wgt Rel Diff (%)		Wave 15 Respondents Nonresp Adj Wgt Rel Diff (%)	
Age of Householder																					
Under 25	4.69	0.13	-34.23	*	-31.44	*	-112.82	*	-111.99	*	-170.18	*	-162.17	*	-236.90	*	-225.49	*	-260.96	*	-241.64	*
25-34	15.21	0.21	-12.03	*	-9.80	*	-28.83	*	-24.87	*	-43.07	*	-37.31	*	-54.15	*	-46.66	*	-66.74	*	-57.52	*
35-54	39.97	0.25	0.84	*	1.86	*	1.11	*	3.62	*	0.99	*	4.63	*	0.45	*	5.60	*	0.76	*	7.07	*
55+	40.13	0.27	5.84	*	4.12	*	11.94	*	9.08	*	15.09	*	11.27	*	17.41	*	12.47	*	18.60	*	12.69	*
Gender of Householder																					
Male	46.82	0.25	-0.28		-0.39		-0.18		-0.11		0.32		0.48		0.62		0.87		0.37		0.65	
Female	53.18	0.25	0.24		0.34		0.16		0.10		-0.28		-0.42		-0.55		-0.78		-0.32		-0.58	
Race of Householder																					
Non-Black	88.09	0.23	0.62	*	0.18	*	0.64	*	0.56	*	1.08	*	0.99	*	1.22	*	1.10	*	1.18	*	1.18	*
Black	11.91	0.23	-4.84	*	-1.35	*	-5.01	*	-4.31	*	-8.76	*	-7.96	*	-10.08	*	-8.92	*	-9.73	*	-9.70	*
HH Type																					
FHHNSP	1.22	0.08	-8.54	*	-6.68	*	-16.90	*	-13.41	*	-29.87	*	-23.52	*	-29.40	*	-19.75	*	-27.71	*	-18.32	*
Reference person is 65 years old or older	22.23	0.23	6.53	*	3.11	*	12.95	*	6.99	*	16.05	*	7.82	*	17.88	*	7.89	*	18.29	*	6.71	*
Other	76.55	0.25	-1.94	*	-0.84	*	-4.26	*	-2.04	*	-5.47	*	-2.21	*	-6.34	*	-2.28	*	-6.56	*	-1.88	*

(Table 1 continued)	All Sample Cases		Wave 3 Respondents		Wave 6 Respondents		Wave 9 Respondents		Wave 12 Respondents		Wave 15 Respondents	
	Initial Weight		Initial Wgt	Nonresp Adj Wgt	Initial Wgt	Nonresp Adj Wgt	Initial Wgt	Nonresp Adj Wgt	Initial Wgt	Nonresp Adj Wgt	Initial Wgt	Nonresp Adj Wgt
Variables	Percent/ Mean	Std Error	Rel Diff (%)	Rel Diff (%)	Rel Diff (%)	Rel Diff (%)	Rel Diff (%)	Rel Diff (%)	Rel Diff (%)	Rel Diff (%)	Rel Diff (%)	Rel Diff (%)
Educational Attainment of Householder												
Less than High School	4.61	0.14	0.88	1.52	5.19 *	2.90	5.65 *	2.97	6.72 *	2.89	7.90 *	3.42
High School, no diploma	6.75	0.14	-5.22 *	-4.70 *	-5.27 *	-7.58 *	-6.14 *	-8.14	-7.72 *	-10.09	-10.72 *	-14.42 *
High School graduate	58.64	0.32	-0.32	-0.35	-1.03 *	-1.09 *	-1.48 *	-1.46	-1.75 *	-1.86	-1.49 *	-1.59 *
College graduate	30	0.32	1.58 *	1.43 *	2.23 *	3.13 *	3.13 *	3.87	3.73 *	4.91	3.59 *	5.08 *

Source: U.S. Census Bureau, Survey of Income and Program Participation, 2008 Panel. For information on sampling and nonsampling error see

<http://www.census.gov/programs-surveys/sipp/tech-documentation/source-accuracy-statements.html>.

* The estimate for respondents is significantly different from the full sample estimate at the 90% confidence level.

Table 2. Odds Ratios from Logistic Regression Model

Model Variables	Wave 3 Odds Ratio	Wave 3 90% CI	Wave 6 Odds Ratio	Wave 6 90% CI	Wave 9 Odds Ratio	Wave 9 90% CI	Wave 12 Odds Ratio	Wave 12 90% CI	Wave 15 Odds Ratio	Wave 15 90% CI
Region										
Northeast†	1	--	1	--	1	--	1	--	1	--
Midwest	1.11*	(1.01, 1.21)	0.98	(0.91, 1.06)	0.99	(0.92, 1.06)	0.99	(0.93, 1.06)	0.99	(0.93, 1.05)
South	1.06	(0.99, 1.14)	1.07*	(1.01, 1.14)	1.12*	(1.06, 1.18)	1.08*	(1.02, 1.14)	1.08*	(1.02, 1.14)
West	0.79*	(0.73, 0.86)	0.73*	(0.69, 0.78)	0.75*	(0.7, 0.8)	0.73*	(0.69, 0.78)	0.75*	(0.7, 0.8)
Age										
15-24	0.31*	(0.28, 0.35)	0.21*	(0.19, 0.23)	0.18*	(0.16, 0.2)	0.16*	(0.15, 0.18)	0.16*	(0.14, 0.18)
25-34	0.5*	(0.46, 0.54)	0.45*	(0.42, 0.47)	0.41*	(0.38, 0.43)	0.4*	(0.38, 0.42)	0.37*	(0.35, 0.39)
35-44	0.73*	(0.68, 0.8)	0.73*	(0.69, 0.77)	0.69*	(0.66, 0.73)	0.7*	(0.66, 0.74)	0.67*	(0.64, 0.7)
45-54†	1	--	1	--	1	--	1	--	1	--
55-64	1.12*	(1.03, 1.22)	1.23*	(1.16, 1.3)	1.24*	(1.16, 1.32)	1.3*	(1.22, 1.38)	1.28*	(1.21, 1.35)
65+	1.34*	(1.24, 1.46)	1.44*	(1.35, 1.53)	1.44*	(1.35, 1.53)	1.47*	(1.38, 1.56)	1.37*	(1.3, 1.45)
Gender										
Male†	1	--	1	--	1	--	1	--	1	--
Female	1.08*	(1.04, 1.13)	1.06*	(1.02, 1.1)	1.05*	(1.01, 1.08)	1.05*	(1.01, 1.1)	1.07*	(1.03, 1.11)
Race										
White†	1	--	1	--	1	--	1	--	1	--
Black	0.81*	(0.75, 0.87)	0.92*	(0.86, 0.98)	0.87*	(0.82, 0.93)	0.88*	(0.83, 0.94)	0.91*	(0.86, 0.97)
Asian	0.77*	(0.69, 0.87)	0.79*	(0.72, 0.87)	0.83*	(0.76, 0.92)	0.82*	(0.74, 0.91)	0.87*	(0.78, 0.97)
Other	0.83*	(0.74, 0.93)	0.9*	(0.81, 1)	0.85*	(0.77, 0.94)	0.83*	(0.74, 0.93)	0.84*	(0.74, 0.95)
Hispanic Origin										
Hispanic origin†	1	--	1	--	1	--	1	--	1	--
Non-Hispanic origin	1	(0.92, 1.08)	0.92*	(0.86, 0.98)	0.85*	(0.81, 0.89)	0.88*	(0.83, 0.93)	0.85*	(0.8, 0.91)
Education										
Less than high school	0.96	(0.86, 1.07)	1.05	(0.97, 1.15)	1	(0.92, 1.09)	1.04	(0.95, 1.14)	1.04	(0.96, 1.14)
9th-12th grade, No diploma	0.79*	(0.73, 0.85)	0.87*	(0.81, 0.94)	0.88*	(0.83, 0.95)	0.89*	(0.83, 0.95)	0.85*	(0.79, 0.92)
High school graduate/Associate degree†	1	--	1	--	1	--	1	--	1	--
Bachelor's or higher degree	1.11*	(1.05, 1.18)	1.11*	(1.06, 1.17)	1.13*	(1.08, 1.18)	1.13*	(1.08, 1.17)	1.1*	(1.05, 1.15)

(Table 2 continued)

Model Variables	Wave 3 Odds Ratio	Wave 3 90% CI	Wave 6 Odds Ratio	Wave 6 90% CI	Wave 9 Odds Ratio	Wave 9 90% CI	Wave 12 Odds Ratio	Wave 12 90% CI	Wave 15 Odds Ratio	Wave 15 90% CI
Marital Status										
Married†	1	--	1	--	1	--	1	--	1	--
Widowed	0.73*	(0.66, 0.8)	0.7*	(0.65, 0.76)	0.66*	(0.61, 0.71)	0.59*	(0.55, 0.63)	0.59*	(0.55, 0.63)
Divorced	0.7*	(0.66, 0.75)	0.69*	(0.65, 0.73)	0.67*	(0.63, 0.7)	0.65*	(0.62, 0.68)	0.64*	(0.61, 0.68)
Separated	0.57*	(0.51, 0.64)	0.53*	(0.47, 0.6)	0.51*	(0.47, 0.56)	0.46*	(0.42, 0.5)	0.47*	(0.42, 0.53)
Never married	0.71*	(0.67, 0.75)	0.7*	(0.67, 0.73)	0.68*	(0.65, 0.72)	0.67*	(0.64, 0.71)	0.68*	(0.65, 0.72)

Source: U.S. Census Bureau, Survey of Income and Program Participation, 2008 Panel.

† Reference category

* P-value < 0.10